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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,477	07/02/2003	Robert W. Boesel	029573-0501	9531

23524 7590 10/05/2006

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EXAMINER

ZISKIND, ANNA Y

ART UNIT

PAPER NUMBER

2611

DATE MAILED: 10/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/613,477

Applicant(s)

BOESEL ET AL.

Examiner

Anna Ziskind

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-15 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claims 1-8 are objected to because of the following informalities: claim 1 includes the phrase "without addressing all timing hypothesis individually," which is confusing because the plurality of the word "all" doesn't agree with the singularity of the word "hypothesis." The claim language would be clearer if the word "all" were changed to "every." Further, in claim 5, the variables  $E_c$  and  $N_o$  are not defined. Appropriate correction is required.

Claim 12 is objected to because of the following informalities: the claim refers to "the addition permutations," whereas there is insufficient antecedent basis for this reference.

Claims 14 and 15 are objected to because of the following informalities: claim 14 refers to a "sufficient number of correlations," whereas correlations are not discussed in any earlier claim language.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the second step of claim 1 recites "providing output of the combining ... as an added input to

the plurality of channel measurements." This claim language is unclear firstly because a plurality of channel measurements is just a collection of quantities and the plurality doesn't have an input, because it is not a module. Secondly, this step doesn't make clear the intended function of feeding back the output of the combining step to the input of the combining step, as described in the specification. However, to further prosecution, the above feedback function is assumed in claim 1.

Further, the language of claim 2 does not sufficiently explain what inputs  $S_1$  and  $S_2$  represent, nor what the output  $S_T$  represents.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 4347580 (Bond). Bond teaches an array correlator that performs correlations by separating digital samples into a plurality of groups in order to be stored in two shift registers, performing partial sums on the plurality of groups, and combining the results of the partial sums to obtain a correlation (Fig. 3,

references 42, 44, 48, and 54; Col. 4, lines 52-62; Col. 6, lines 33-57; Col. 7, lines 19-38).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5164959 (Cai et al.) in view of US Patent 4550414 (Guinon et al.).

As to claim 1, Cai teaches an equalization method that includes combining a plurality of channel measurements in a summer (Fig. 6, reference 33), coupling the output of the combining step back into a loop feeding the input of the combining step, and acquiring a signal symbol based on the results of the combining step (Fig. 6; Col. 4, lines 22-31; Col. 5, lines 54-64). However, Cai doesn't teach that the symbol acquisition is done without exhausting all the timing hypotheses through correlation. Guinon teaches that, depending upon channel conditions and signal phase probabilities, the range of a correlation detector can be narrowed so that not all timing hypotheses are addressed through its function (Col. 2, line 63 – Col. 3, line 11). Therefore, it would have been obvious to one of ordinary skill in the art to employ the correlation range limiting technique discussed in Guinon with the detection loop taught by Cai. Doing so would decrease the number of correlations being done by the system for each symbol, thereby decreasing the signal acquisition time of the system (Guinon, Col. 2, lines 63-67).

As to claim 4, Cai teaches multiplying a received signal (Fig. 6, reference 41) by a channel reliability factor (Fig. 6, reference 42) in order to provide the product as a channel measurement to the summer (Fig. 6, reference 44).

As to claim 6, Cai doesn't teach that the channel measurement iterations are 1 chip apart. Guinon teaches PN code auto-correlation that is also done for every chip of the code. Therefore, it would have been obvious to one of

ordinary skill in the art to make channel measurements for each received signal chip. Doing so would accurately track channel changes with the smallest granularity possible in the system.

As to claim 7, Cai teaches that a threshold is applied to the channel measurements in order to acquire a signal symbol (Fig. 5b; Col. 5, lines 6-18).

As to claim 8, Cai teaches the use of a predetermined threshold, as described above, except for making it programmable. It would have been obvious to one having ordinary skill in the art to make the threshold programmable, since it has been held that the provision of adjustability, where needed, involves only routine skill in the art. In re Stevens, 101 USPQ 284 (CCPA 1954).

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5164959 (Cai et al.) in view of US Patent 4550414 (Guinon et al.) further in view of Loeliger et al., "Probability Propagation and Decoding in Analog VLSI," IEEE Trans. on Information Theory, Vol. 47, No. 2, pgs. 837-843, Feb. 2001.

As to claim 2, neither Cai nor Guinon teaches the claimed combining equation. However, the specification of the instant invention identifies the combining operation as the soft XOR operation (Pgs. 6 and 7, ¶10089). Loeliger teaches the same soft XOR equation in a different form, using the hyperbolic tangent function (Pg. 838, Section II, Eqn. (3)). Therefore, it would have been

obvious to one of ordinary skill in the art to implement the soft XOR method of combination in the design taught by Cai and Guinon. The transistor-level design for the soft XOR is well known (Loeliger, Fig. 1) and would be easy to implement in an integrated circuit.

As to claim 3, Cai teaches a feedback loop in which the output of the summer is coupled back into the input of the summer through a phase demodulator, multiplier, channel estimator, and another multiplier (Fig. 6). Therefore, the output of the combining operation eventually becomes the input to the combining operation.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4347580 (Bond) in view of US Patent 4550414 (Guinon et al.). Bond doesn't teach that performing partial sums includes rotating and combining all combinations of the samples. Guinon teaches that in order to find the properly aligned PN sequence, correlations must be performed for all possible phase shifts (Col. 2, lines 25-45). Therefore, it would have been obvious to one of ordinary skill in the art to combine every possible phase variation when calculating the partial sums, which are part of the correlation operation. Doing so would ensure that the correct PN sequence phase is found.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4347580 (Bond) in view of US Patent Application Publication 2003/0147365 (Terasawa et al.). Bond doesn't teach that addition included in



the correlation operation was a coherent combining. Terasawa teaches a searching system that includes coherent combination upon correlation (Fig. 4, references 420 and 440; Fig. 9; Pg. 6, ¶0065). Therefore, it would have been obvious to one of ordinary skill in the art to use coherent combination in order to accumulate the correlations. Doing so would allow for the generation of an accumulated result from which the correct PN phase can be found.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Application Publication 2002/0094017 (Wang) in view of US Patent 4347580 (Bond). Wang teaches a searcher method that separates incoming samples into an even and odd phase group, provides the samples to a demodulator, as needed, and provides the samples to a searcher (Fig. 4; Pg. 2, ¶0017; Pg. 3, ¶0026 and 0028). Since the samples are first processed by the searcher and then sent to the demodulator, which operates based on the results of the searcher, the samples that are provided to the searcher are never needed by the demodulator because of the process flow of the system. However, Wang doesn't teach storing the samples in sample buffers. Bond teaches the use of buffers to store samples (Fig. 3, references 42 and 44). Therefore, it would have been obvious to one of ordinary skill in the art to store samples in buffers in order to provide cheap and efficient access to received samples for processing modules.

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Application Publication 2002/0094017 (Wang) in view of US Patent 4347580 (Bond) further in view of US Patent 4484028 (Kelley et al.). Neither Wang nor Bond teaches entering or leaving a power down state. Kelley teaches a transceiver with a power up/down circuit that enters a power down state when the transceiver is idle, meaning that all correlations on received signals are done, and leaves the power down state upon detection of activity (Col. 2, lines 36-54). Therefore, it would have been obvious to one of ordinary skill in the art to include a power up/down circuit in the system taught by Wang and Bond in order to save power during times of inactivity.

***Allowable Subject Matter***

Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Also, parent claim 1 of claim 5 must be rewritten to overcome the 35 U.S.C. §112, 2<sup>nd</sup> paragraph rejection. The following is a statement of reasons for the indication of allowable subject matter. A search of prior art failed to teach, either alone or in obvious combination, a method of searching digital communication signals that includes multiplying a received chip by a channel reliability factor, wherein the reliability factor is determined according to the equation claimed in claim 5.

Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter. A search of prior art failed to teach, either alone or in obvious combination, a method for performing a number of correlations that includes calculating partial sums of all combinations of phase-shifted samples.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Ziskind whose telephone number is (571) 272-2769. The examiner can normally be reached on Mon. - Fri., 8:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anna Ziskind  
Examiner  
Art Unit 2611

  
CHIEH M. FAN  
SUPERVISORY PATENT EXAMINER